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Learning about river basin complexity and governance through a role-playing game

The use of Wat-A-Game for pedagogical purposes in Southern Africa

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This brief describes three applications of the Wat-A-Game platform for pedagogical purposes in Mozambique and Zimbabwe. After a presentation of the game features, the three sessions are summarized and feedbacks from participants are discussed. Some perspectives in terms of future potential applications are finally provided.

Participation, learning and role-playing games

Participation in order to design and implement common rules for water management (Ostrom, 1990) is a difficult exercise, which implies bringing around the negotiation table very different stakeholders to discuss about complex issues.

To facilitate participation in water management and governance, several tools and processes have been proposed and developed, going from drama representations to citizen juries, forums, and discussion groups.

Role-playing games (RPGs) have been increasingly used as well to promote local stakeholders' participation into natural resource management. "The games, which depend upon the prior diagnosis of the situation by experts, help players to share in this analysis and to draw upon some improvements based on it" (D'Aquino et al., 2003).

Since the end of the Nineties, the Companion Modelling (ComMod) approach (Bousquet et al., 2011) uses a combination of computer models and RPGs for "adaptive and participatory research" (Barreteau et al., 2011). Compared to classical RPGs, ComMod produces "a decidedly different form of RPGs: a self-designed RPG. There are no prior rules and …-… the RPG is designed solely from a self-analysis of the players' situation" (D'Aquino et al., 2003).

RPGs can be used for different goals other than facilitating participation. According to Barreteau (2003) "RPGs encountered in science or development processes can be categorized into three types of uses: training, research or policy making. The first one is however predominant. This type of RPGs aims at placing players in real life situations in order to train them to react to specific conditions or to foster interactions among them according to a specific question".

RPGs for training goals are seen as pedagogical tools to empower trainees by reducing the frequent "black box" effect of the training supports and facilitating the learning process through practical applications of theoretical notions.

Similarly, in policy exercises, players are put into a situation that is comparable to the real one they might encounter and from which they learn the consequences of the reactions they might have.

Wat-A-Game

Inspired by the ComMod principles, "Wat-A-Game (WAG) is a platform providing toolkits, methodological guidelines, online simulation and web-services for supporting the design of RPGs by and for a wide range of stakeholders in order to explore water management strategies and discuss water policies. WAG may be used in an operational context, as a tool to support social learning, coordination and design of public policies for catchment management, as well as in a pedagogical context as a tool for learning modules related to multi-level governance" (Abrami et al., 2012).

Since 2011, IWEGA uses WAG (Ferrand et al., 2009) as a pedagogical support during teaching and training sessions in the SADC region. The three applications presented in this policy brief show the flexibility of the platform, which was successfully used with MSc students in Mozambique and Zimbabwe and with senior officers of the Mozambican National Water Directorate (DNA). The initial set-up of the game was inspired by the simplest version of WAG, called IniWAG, and previously used for experimental purposes (Rydannykh, 2011).

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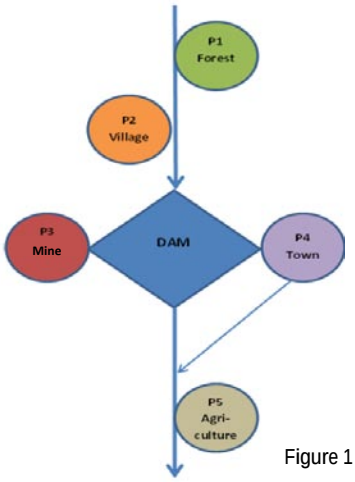

Figure 1 – The WAG Playground

In the WAG playground, blue signs on the table represent a river system (Fig. 1). The river flows from the side of the table where Player 1 is situated. After passing through the territory of Players 1 and 2 it reaches the dam, where Players 3 and 4 are placed. And lastly it goes through the plot of Player 5.

Blue and red marbles represent clean and polluted water. Little yellow squares called WAGs represent players' resource for survival. Players' actions in the game result in gaining or losing WAGs.

Players dispose of three plots of land each that allow them to perform their activities, which consist of choosing among their initial endowment of action cards.

Action cards represent socioeconomic activities through which players use and produce resources and provoke pollution. For instance If a player wants to play the card in Fig. 2, (s)he needs two units of clean water, one unit of polluted water and three WAGs. As a result of this action, the player releases one unit of polluted water back to the river (return flow) and gets four WAGs.

Several types of action cards are available. In this simplest version of WAG, the initial endowment of four cards each cannot be modified by the players, which can only choose how to combine the cards on their three land plots at the beginning of each round.

The players' objective in the presented sessions was to manage the common water resources in order to increase (or at least not reduce) their resources for survival (WAGs).

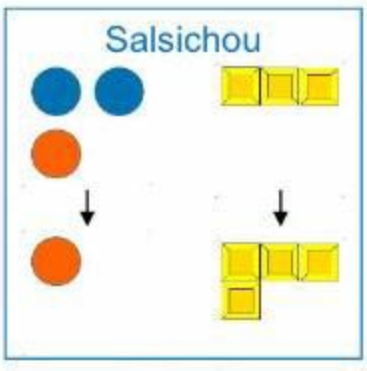

Figure 2 – Action card "Salsichou"

The game consists of several rounds that represent years. Before the beginning of each round the facilitator announces the rainfall forecasts for that year and the consequent expected amount of water flowing in the river basin, while players choose which action cards to play.

Three pedagogical experiences in Southern Africa

The three sessions described below were all based on the same simple set-up illustrated in the previous section. In terms of calibration, thirty three units of water represented the flow on the first year, eight units were available in the dam, and each player had an initial endowment of twelve WAGs, three plots of land and four action cards, as suggested by Rydannykh (2011).

Despite the identical initial set-up of the sessions, the only aim of the following comparison of experiences is descriptive, as no control over the game parameters was implemented.

The first WAG session was played in November 2011 with six MSc students at the University Eduardo Mondlane in Maputo. The session was facilitated by one person and the language of the game was Portuguese, although the instructions distributed were in English. Five simulated years were played.

In terms of session's dynamics, after a crisis on the second year, there was a consensus on the need of doing something to improve the level of water quality in the catchment, to respect the international obligations and to improve the income of certain players (Fig. 3 and Fig. 4).

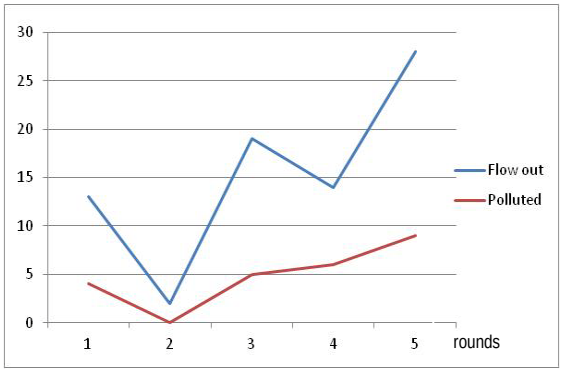

Figure 3 – Water dynamics in session 1

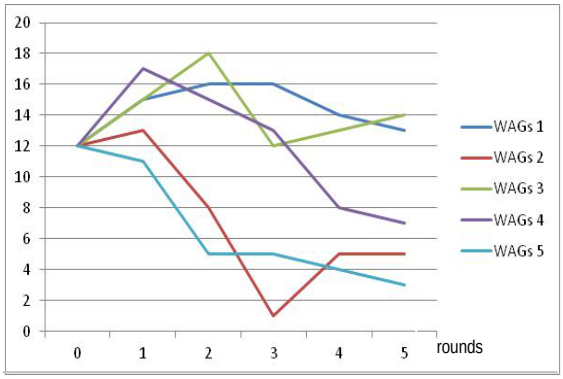

Figure 4 – WAGs dynamics in session 1

Therefore, at year two players 2, 3 and, to a smaller extent players 1 and 4, adopted strategies to pollute less and use less water. At year three, after observing that these strategies were not sufficient to solve the problems of water scarcity, pollution and mismatch of international obligations, all players accepted the proposal by the State to co-finance at 50% a project to dig a well and use the aquifer. Players 1,3 and 4 paid one third each of the remainder 50% investment cost. Players 1,2,3 and 4 paid one WAG each for O&M on the 5th round.

The second WAG session was played in May 2012 at the University of Zimbabwe in Harare. The players (24) were all students from the WaterNet regional MSc in IWRM. They split into five teams. The session was facilitated by one person and the language of the game was English. Six simulated years were played (Fig. 5 and Fig. 6).
Hit by the drought on year two and under the "threat" of environmental penalties, all players adapted their strategies in order to reduce pollution and water use. They also met to discuss a possible common investment for a pollution treatment plant or a borehole to increase water availability, but no consensus was found on who should support the subsequent costs.
After a new water crisis at years four and five, following a new round of unsuccessful negotiations, the State proposed a new project to dig a well and make use of the aquifer. 50% of the investment cost was paid by the state and the remaining 50% was covered by players as follows: Players 1 and 3 paid three WAGs and players 4 and 5 paid one WAG each. Player 2 was exempted and the State paid his share. Pollution tax was raised to two WAGs/unit of pollution. The mine (player 3) proposed to pay the O&M costs for the borehole and this decision was very welcome by the other players.

The third WAG session was played in October 2012 at the National Directorate of Water (DNA) in Maputo. The participants (25) were all senior officers from the Mozambican Ministry of Public Works based at the National Directorate for Water (DNA) in Maputo or at the five regional river basin organizations (ARAs) in Mozambique.
They split into five teams. The session was facilitated by two persons and the language of the game was Portuguese. Five simulated years were played (Fig. 7 and Fig. 8).

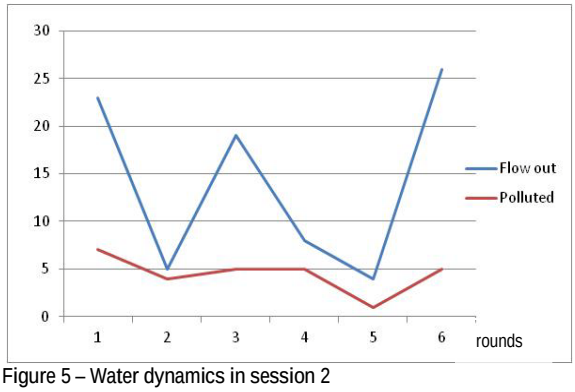

Figure 5 – Water dynamics in session 2

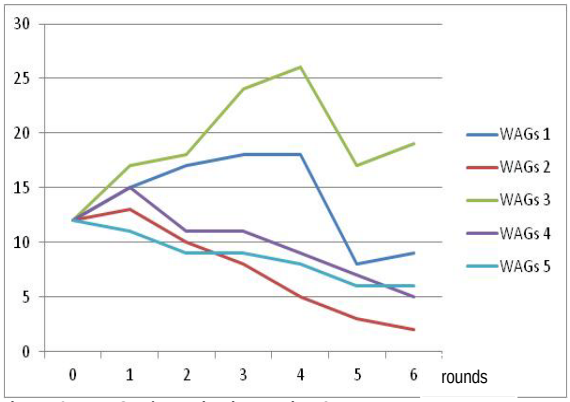

Figure 6 – WAGs dynamics in session 2

Some innovations were introduced in this session, namely:
- Policies based on the Polluter-Pays Principle (PPP).
- Penalties to be paid by all players if the environmental standards were not respected.
- Pollution abatement cards.

The introduction of environmental policies influenced strongly the strategies of the players. The PPP and the increasing penalty for the non respect of the reserve pushed players towards water saving and less polluting activities. But it was the introduction of pollution abatement technologies (cards) that marked players' strategies and outcomes. The environmental subsidies combined with an over-use of the dam in the middle of the catchment allowed all players enjoying high performances in terms of WAGs earnings at the end of the session.

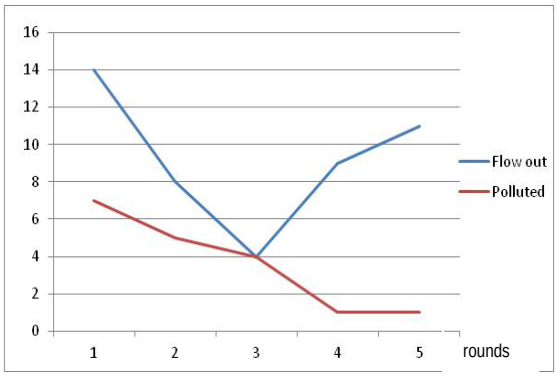

Figure 7 – Water dynamics in session 3

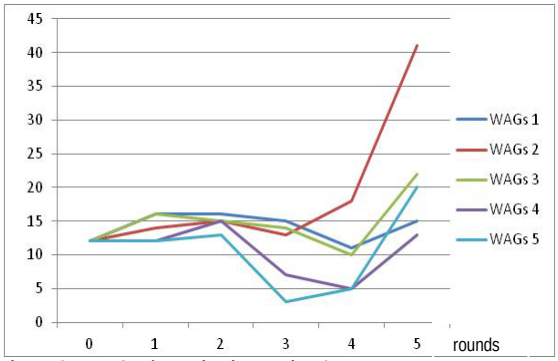

Figure 8 – WAGs dynamics in session 3

Discussion and perspectives

The three presented game sessions had a pure pedagogical purpose and aimed at facilitating the discussion among participants and the practical application of concepts and terms presented during the training or teaching sessions that included the game. WAG proved to be a useful and simple tool allowing participants to discuss and approach several aspects of the river basin functioning otherwise resulting too theoretical and abstract for them.

The game was particularly useful to show the influence of policy tools for water management and to represent negotiation processes among water users.

Participants looked excited, almost "fighting", during the game sessions (Fig. 9).

The following list summarizes the most frequent comments by players during the debriefing conducted after the three sessions:

- It was fun and exciting. Time passed very quickly;
- It was very pedagogical. Issues presented during the course have been practically dealt with;
- It was a good representation of complexity;
- It showed how conflicts arise when several interests refer to the same common pool resource;
- It helped looking at the problem from different points of view;
- It allowed a negotiation for the solution of a common problem;

Figure 9 – Discussions during session 3

- It can be very useful in policy-making contexts;
- It can be useful as a tool to extract information at the catchment level.

The sessions presented used the simplest version of WAG (IniWAG) and the set-up of the game was previously chosen by the facilitators. One can think of a different set-up constructed together with the players in order to combine the pedagogical and the participatory learning objectives. WAG allows this type of processes, which would simply require more time before and during the sessions.

Detailed information about WAG is available at the dedicated web site www.watagame.info, where the new IniWAG box prototype is presented and the game can be downloaded free of charge for dissemination and immediate use.

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